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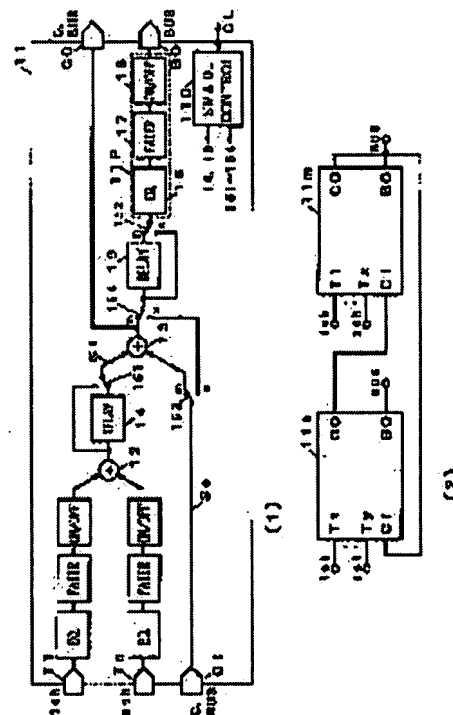
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(54) BIDIRECTIONAL CASCADE CONNECTING MIXER

(57)Abstract:

PROBLEM TO BE SOLVED: To take out a total output from a mixer at an optional position by making it possible to use a mixing signal by each mixer in cascade connection of a digital mixer.

SOLUTION: A bi-directional cascade connecting mixer 11 adds plural input signals 1 to n (x, y)ch together by an adder 12 and adds a cascade signal Sc outputted from another mixer thereto by an adder 13 to output as a cascade output (CO). Switches 153 and 154 switch a signal to give mixing output stages 16 to 18 to an adding signal Si or the cascade signal Sc depending on a cascade master 11m or a cascade slave 11s. Based on setting of a controller 11C, the switches 153 and 154 are switch-controlled and a delay circuit 19 adjusts a phase difference between the mixing output signals of each of the mixers 11m and 11s.



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CLAIMS

[Claim(s)]

[Claim 1] An input addition means to add two or more input signals and to output an input addition signal, and the cascade input means for inputting the cascade signal outputted from other digital mixers, A cascade output means to output the addition signal or said input signal of said input addition signal and cascade signal as a cascade signal, The bidirectional cascade connection mixer characterized by changing any of said input addition signal or a cascade signal they are, and providing the switching means to output and a mixing output means to output the signal outputted from this switching means as a mixing output signal.

[Claim 2] Said mixing output means is a bidirectional cascade connection mixer according to claim 1 characterized by having a delay means for adjusting the phase of a mixing output signal.

[Claim 3] Furthermore, the bidirectional cascade connection mixer according to claim 2 characterized by providing the control means for setting up the change of said switching means, and the amount of delay of said delay means.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the bidirectional cascade connection mixer with which two or more set cascade connection of the digital mixer is carried out in a digital audio equipment.

[0002]

[Description of the Prior Art] When using them, carrying out cascade connection of two or more digital mixers which have conventionally the function which processes two or more input signals and is mixed, each digital mixer mixes the cascade output signal from the digital mixer of the preceding paragraph, and he is trying it not only processes and to mix two or more input signals inputted from their internal bus, but to give it to a latter digital mixer.

[0003] Drawing 1 shows this kind of conventional technique. For example, as shown in drawing 1 (1), when cascade connection of the digital mixers MA and MB is carried out and the addition result of the input signal of oneself in each mixers MA and MB is set to "SA" and "SB", the final total addition result "SA+SB" is obtained from the digital mixer MA which is a cascade master, and can obtain only an own addition result "SB" from the digital mixer MB used as a cascade slave.

[0004] Drawing 1 (2) blocks and shows signal processing by the cascade connection of drawing 1 (1). The digital mixer MA has x input channels 1 and 2, --, xch, and the digital mixer MB has y input channels 1 and 2, --, ych. Since the cascade output of the addition result "SB" of the digital mixer MB is carried out and a cascade input is carried out at the digital mixer MA, an addition result "SA+SB" is obtained from the digital mixer MA of a master by adding this cascade input signal to an own addition result "SA." In addition, the delay element DL between the cascade adders AC of the own input adder A.I. Artificial Intelligence of digital mixer MA and the cascade input signal from the digital mixer MB of a slave is formed in order to amend the phase contrast between both the digital mixers MA and MB.

[0005] Next, by adding the digital mixer MC of a slave further, as shown in drawing 1 (3), also when cascade connection of the digital mixers MA, MB, and MC is carried out That a final addition result "SA+SB+SC" can be obtained It is the digital mixer MA of the last stage, and only an intermediate addition result "SB+SC" and "SC" (SC is as a result of [of the own input signal of mixer MC] addition) can be obtained from the digital mixers MB and MC of the preceding paragraph.

[0006] Thus, in the conventional technique, when cascade connection of two or more sets of the digital mixers is carried out, the total addition result mixed can be obtained only to the master digital mixer MA of the last stage.

[0007]

[Problem(s) to be Solved by the Invention] This invention can use the signal mixed also when cascade connection of two or more sets of the digital mixers was carried out with each digital mixer in view of such inconvenience, and aims at offering the bidirectional cascade connection mixer which enabled it to take out a total output from the digital mixer of the location of arbitration.

[0008]

[Means for Solving the Problem] An input addition means according to this invention to add two or

more input signals and to output an input addition signal, The cascade input means for inputting the cascade signal outputted from other digital mixers, A cascade output means to output the addition signal or input signal of an input addition signal and a cascade signal as a cascade signal, The bidirectional cascade connection mixer which changes any of an input addition signal or a cascade signal they are, and possesses the switching means to output and a mixing output means to output the signal outputted from this switching means as a mixing output signal is offered.

[0009] In the bidirectional cascade connection mixer of this invention, it has a delay means for adjusting the phase of a mixing output signal to a mixing output means, and the control means which sets up the change of a switching means and the amount of delay of a delay means is also provided further.

[0010] It is changed whether the result added with the digital mixer itself is outputted by the switching means for changing the bus to output, speaking directly, or the addition result obtained with other digital mixers is outputted, and the delay for adjusting the phase contrast of each digital mixer output is given with a delay means, and a change and the amount of delay of a bus are set as each digital mixer by the memory apparatus with which the control means was equipped.

[0011] [Operation] In the bidirectional cascade connection mixer by this invention, the input addition signal adding the signal from two or more input channels and the cascade signal outputted from other digital mixers are added, and it outputs as a cascade output. The switching means which changes by the control means and is controlled changes the signal which the digital mixer concerned gives to a mixing output stage according to a cascade master or a slave to any of an input addition signal or a cascade signal. Based on setting out by the control means, the switch delay circuit which adjusts the phase contrast between the mixing output signals between each digital mixer is established in a mixing output stage.

[0012] Therefore, according to this invention, the function changed so that the signal with which each digital mixer which receives delivery and it in other digital mixers was sent in the addition result signal of the bus by which cascade connection was carried out may be used is given. That is, each bus output can be similarly treated now by returning all addition results to other digital mixers. Therefore, in using the cascade connection of two or more sets of digital mixers, on signal processing, which digital mixer does not need to take a cascade master or a cascade slave into consideration, can deal with each digital mixer, and can take out a total output from the digital mixer of the location of arbitration.

[0013]

[Embodiment of the Invention] Hereafter, the suitable example of this invention is explained in full detail, referring to a drawing. In addition, the following examples are mere examples and modification various in the range which does not deviate from the pneuma of this invention is possible for them.

[0014] [Fundamental configuration of a mixer unit] Drawing 2 shows the fundamental example of a unit configuration used as the parent of a cascade connection mixer. This digital mixer 1 is equipped with the input signal terminals T1-Tn of two or more (n) individuals, the cascade input terminal CI, adders 2 and 3, the delay (delay) circuit 4, the mixing output terminal BO, and the cascade output terminal CO. The input signal of input channel 1 ch-nch of two or more (n) books from an internal bus is given to the input signal terminals T1-Tn, and the cascade input signal Sc is given to the cascade input terminal CI through a cascade bus from a preceding paragraph digital mixer. An adder 2 adds the input signal of channel 1 ch-nch, and an adder 3 performs addition with this addition result signal Si and the cascade input signal Sc from the cascade input terminal CI.

[0015] An adder 2 and the delay circuit 4 prepared among three have the function which amends the phase contrast of the input signal of channel 1 ch-nch of digital mixer 1 self, and the cascade input signal from a preceding paragraph digital mixer as mentioned above, and delay setting out is carried out based on the amount of signal delay of the proper between the preceding paragraph digital mixer connected to the cascade input terminal CI, and this digital mixer 1. When delay of this delay circuit 4 is "0", it is bypassed with the switch element 5 and a delay function is turned off.

[0016] The addition result of an adder 3 is outputted to the own internal bus BUS through the mixing output terminal BO after a carrier beam in processing in the processing section of an equalizer 6, a fader 7, and an ON / off element 8 grade. The addition result of an adder 3 is outputted to the cascade output

terminal CO again in order to pass a signal to a next step digital mixer.

[0017] [Two sets of the cases] Now, the internal configuration and connection relation of a digital mixer of a bidirectional cascade connection mixer by one example of this invention are shown, and drawing 3 (1) is the 1st example of a unit configuration of each digital mixer which constitutes a bidirectional cascade connection mixer, and expresses the internal structure of the digital mixer at the time of taking into consideration only about what is done for the two-set cascade connection of the digital mixer to drawing 3.

[0018] This digital mixer 11 like the example of a basic unit of drawing 2 The input signal terminals T1-Tn of two or more (n) individuals, Mixing output signal processing section 11P which consist of the cascade input terminal CI, the input signal adder 12, the cascade adder 13, the 1st delay circuit 14, the 1st switch element 151, and equalizer 16, fader 17 and ON / off element 18 grade, while having the mixing output terminal BO and the cascade output terminal CO, amelioration adds to the example of drawing 2 further -- having -- the 2- it has the 4th switch elements 152-154 and 2nd delay circuit 19.

[0019] The 2nd delay circuit 19 gives the delay for adjusting the phase contrast of the output of each digital mixer by which cascade connection is carried out, and each switch elements 151-154 and delay circuits 14 and 19 are controlled by the switch and delay control-section 11C which consist of CPUs. A switch and delay control-section 11C receive the control signal from central apparatus through control line CL, and set a change and the amount of delay of a bus as each digital mixer by the memory apparatus with which control-section 11C was equipped.

[0020] Thus, by carrying out cascade connection like drawing 3 (2), changing each switch elements 151-154 suitably, and setting them up, two sets of the digital mixers 11 constituted can make a cascade master one digital mixer 11m (several input channels $n=x$), and they can operate digital mixer 11s (input channel several $n=y$) of another side as a cascade slave. In addition, generally the digital mixer which outputs the addition result of the addition result signal S_i of the signal from an input channel and the cascade input signal S_c from the cascade input terminal CI on an own bus (BUS) is called "cascade master", and the digital mixer which outputs the addition result signal S_i of the signal from an input channel on a cascade output bus (Cascade BUS) is called "cascade slave."

[0021] If it explains in more detail, when using the digital mixer 11 of drawing 3 (1) as cascade master mixer 11m of drawing 3 (2), each switch elements 151-154 are changed like [in digital mixer 11m shown in the lower part of drawing 4]. namely, the 3rd switch element 153 -- an adder -- it connects with (m) 13 side and is set as the condition of adding the own signal S_i of digital mixer 11m and the cascade input signal S_c . moreover, the 4th switch 154 -- an adder -- it connects with (m) 13 side and is set as the condition of choosing S_i+S_c as a result of being added as mentioned above. this time -- the 2nd switch element 152 -- the 2nd delay circuit -- it connects with (m) 19 side and a delay circuit 19 is used for phase correction with a mixing signal [which is outputted from output-signal processing section 11P], and other digital mixer, i.e., cascade slave mixer, 11s mixing signal.

[0022] On the other hand, when using the digital mixer 11 of drawing 3 (1) as cascade slave 11s of drawing 3 (2), each switch elements 151-154 are changed like [in digital mixer 11s shown in the upper part of drawing 4]. That is, the 3rd and 4th switch elements 153,154 are connected with digital mixer 11m a reverse side at (s), and the cascade input signal S_c is set up so that it may be sent only to the mixing output terminal BO side through an adder 13. Moreover, fundamentally [the 2nd switch element 152], it connects a common terminal side at (s), and the 2nd delay circuit 19 is turned off.

[0023] Thus, with the configuration of drawing 3 (1), the 3rd for sending a signal for the signal S_c inputted from the cascade to processing of Bus BUS in addition to the fundamental function to add the cascade input S_c and the 4th changeover switch element 153,154, and the delay circuit 19 for amending the phase contrast generated when returning addition result S_i+S_c to other mixers are added. In addition, although restricted to the two configuration cascade of drawing 3 (1), with the configuration of drawing 5 (1) mentioned later, two or more sets of cascades become possible.

[0024] As shown in drawing 3 (2) and drawing 4, when cascade connection of two sets of the digital mixers 11m and 11s is carried out, like ****, the signal of cascade master mixer 11m input channel 1 ch-xch is added, addition result S_i+S_c is outputted from the cascade output terminal CO, and it inputs

from the cascade slave mixer 11s cascade input terminal CI. Here, in digital mixer 11m, in order to double a phase with the addition result S_i of the signal of own input channel 1 ch-xch from digital mixer 11s at the cascade signal S_c , the addition result signal S_i is added with this cascade input signal S_c , after being adjusted in a delay circuit 14. Both digital mixers [11m and 11s] addition result S_i+S_c is obtained by this.

[0025] This addition result signal S_i+S_c can be sent out to the digital mixer 11s cascade input terminal CI from the this cascade master mixer 11m cascade output terminal CO, and can use an addition result also with a this cascade slave mixer 11s bus BUS output through the 3rd and 4th switch elements 153,154 while it is used with a digital mixer 11m bus (BUS) output.

[0026] Moreover, in order to amend the phase contrast of a digital mixers [11m and 11s] bus (BUS) output, the digital mixer 11m delay circuit 19 is used. Furthermore, by setting up which actuation of the digital mixers 11m and 11s of drawing 4 should be performed to two sets of the digital mixers 11 equipped with the configuration of drawing 3 (1) using memory etc., the switch element 153,154 in each mixer interlocks, and it can change.

[0027] [Three or more sets of the cases] Next, drawing 5 shows the internal configuration and connection relation of a digital mixer of a bidirectional cascade connection mixer by other examples of this invention, and drawing 5 (1) is the 2nd example of a unit configuration of each digital mixer which constitutes a bidirectional cascade connection mixer, and expresses the internal structure of the digital mixer in the case of making it correspond to the cascade connection of three or more sets of digital mixers.

[0028] This digital mixer 21 like the unit of drawing 3 The input signal terminals T1-Tx of two or more (x) individuals, Mixing output signal processing section 21P which consist of the cascade input terminal CI, the input signal adder 22, the cascade adder 23, the 1st and 2nd delay circuits 24 and 29, the 1st and the 2nd switch element 251,252, and equalizer 26, fader 27 and ON / off element 28 grade, Although it has the mixing output terminal BO and the cascade output terminal CO Furthermore, in order to pass the addition result obtained by the cascade output terminal CO to other digital mixers, it has the cascade reply terminal CR and the cascade transmitting terminal CS, and has the 5th switch element 255 corresponding to this. Moreover, each switch element 251,252,255 and delay circuits 24 and 29 are controlled by the same switch as the digital mixer 11 of drawing 3 (1), and delay control-section 21C.

[0029] Drawing 5 (2) by showing the example of the connection condition in the case of carrying out cascade connection of three sets of the digital mixers 21 constituted in this way, changing the switch element 252,255 suitably and setting it up One digital mixer 21m (several input channels $n=x$) can be made into a cascade master, and two sets (input channel several $n=y$) of the digital mixer 21s1 remaining and 21s2 (input channel several $n=z$) can be operated as a cascade slave.

[0030] If it explains in more detail, when using the digital mixer 21 of drawing 5 (1) as cascade master mixer 21m of drawing 5 (2), each switch element 251,252,255 is changed like [in digital mixer 21m shown in the bottom of drawing 6]. namely, the 3rd switch element 255 -- an adder -- it connects with (m) 23 side and is set as the condition of choosing S_i+S_c as a result of adding the own signal S_i of digital mixer 21m and the cascade input signal S_c . this time -- the 2nd switch element 252 -- the 2nd delay circuit -- the mixing signal which is connected to (m) 29 side and outputted from output-signal processing section 21P, and other cascade slave mixer 21s -- the 2nd delay circuit 29 is used for 1 or 21s for phase correction with the mixing output signal of 2.

[0031] On the other hand, in the digital mixer 21 of drawing 5 (1), cascade slave 21s1 of drawing 5 (2), and when using it as 2 for 21s, each switch element 251,252,255 is changed like [in two] for digital mixer 21s1 shown in the pars intermedia and the topmost part of drawing 6 , and 21s. That is, the cascade reply terminal CR prepared in order to pass addition result S_i+S_c from the cascade master mixer 21m cascade output terminal CO to other digital mixers, and the cascade transmitting terminal CS are used. And the signal inputted from the cascade reply terminal CR is outputted from the cascade transmitting terminal CS, and in digital mixer 21s1 which is a cascade slave, and 21s2, it is set up so that the signal from the cascade reply terminal CR may be sent to the mixing output terminal BO.

[0032] each -- for 21s, it sets up so that the signal showing cascade slave 21s1 and addition result S_i+S_c

which the 5th switch element 255 of 2 is connected the cascade reply terminal CR side at (s), and is inputted from this cascade slave reply terminal CR may be sent only to each mixing output terminal BO. moreover, the 1st -- in cascade slave 21s1, a delay circuit 29 can perform phase correction.

[0033] in addition -- drawing 5 (2) and the example of connection of drawing 6 -- the 1st -- the addition result signal from cascade master mixer 21m inputted into the cascade reply terminal CR in cascade slave 21s1 -- the 2nd from the cascade transmitting terminal CS -- it is set up so that the cascade reply terminal CR of cascade slave 21s2 may be passed. the 2nd -- in cascade slave 21s2, although it is set up so that an addition result signal may be sent only to the mixing output terminal BO through the 5th switch element 255 from the SUKEDO reply terminal CR as mentioned above, the 2nd switch element 252 is connected to the common terminal side of the 5th switch element 255, and a delay circuit 29 becomes off.

[0034] Since it cannot realize only by preparing the cascade input / output terminal CI/CO like drawing 3 and drawing 4 (Cascade In/Out) when carrying out cascade connection of three or more sets of the digital mixers, as shown in drawing 5 and drawing 6, in other examples of this invention, a terminal called cascade reply / transmitting terminal CR/CS (Cascade Return/Send) is provided. and the final addition result obtained by these cascade return ***** CR and CS by cascade master mixer 21m -- connection of the cascade input/output terminals CI and CO -- the same -- connecting -- each cascade slave mixer 21s -- it enables it to use this addition result by 2 for 1 or 21s

[0035] However, although it goes to cascade master mixer cascade slave mixer 21s2 and 21s1 to 21m in the cascade input/output terminals CI and CO, the flow of a signal is constituted by cascade return ***** CR and CS so that it may go to slave mixer 21s1 and 21s2 from master mixer 21m. That is, therefore, it comes to choose the return signal from master mixer 21m as slave mixer 21s1 and 21s2.

[0036] As the 3rd switch element 153 prepared in drawing 3 and the example of a configuration of drawing 4 is merged into the function of the cascade input terminal CI for receiving the return signal from cascade master mixer 11m and shows the cascade input terminal CI to drawing 5 and drawing 6, it is communalized as a cascade reply terminal CR, and this reply terminal CR has the semantics as a functional changeover switch. In addition, although two sets of cascade connection are realizable with the digital mixer constituted like drawing 5 and drawing 6, since the cost rise by attaching cascade return ***** CR and CS occurs, when it limits a function to two sets of cascades, it is better [a configuration like drawing 3 and drawing 4].

[0037] Moreover, neither the cascade input/output terminals CI and CO nor cascade return ***** CR and CS needs to exist independently, and an exchange of a signal is attained by one cable by giving an I/O function to one connector.

[0038] [Another example] Drawing 7 and drawing 8 express the example of a configuration of the whole cascade connection digital mixer by still more nearly another example of this invention to a **** outline target. Drawing 7 shows other examples which pass the total output outputted to the total output line tangent line from cascade master mixer 31m to k sets of cascade slave mixer 31s1-31sk(s). Each digital mixer is equipped with the 1st and 2nd switch elements 32 and 33 out of cascade addition means 31A. In addition, about the switch and the delay control section, the graphic display is omitted in the delay circuit established in the output side of the 2nd switch element 33 and the mixing signal-processing section, and a list.

[0039] The switching condition of each switch elements 32 and 33 is controlled like a graphic display according to being used as a cascade master or a cascade slave etc. That is, in the case of cascade master mixer 31m, the 1st switch element 32 is surely made into an ON state, the 2nd switch element 33 is made into an ON state at the adder 31A side, and a total output is obtained by the cascade master mixer 31m mixing output OUTm.

[0040] On the other hand, in cascade slave mixer 31s1-31sk, the 1st switch element 32 is surely made into an OFF state, and the 2nd switch element 33 is made into the switching condition of arbitration according to the mixing output needed. Therefore, to each mixing output OUT1 of cascade slave 31s1-31sk - OUTk, the output according to the established state of the 2nd switch element 33 can be obtained.

[0041] Drawing 8 shows still more nearly another example which added two terminals like drawing 5 and drawing 6, and raised the degree of freedom of a mixing output. Each digital mixer 41m and 41sl-41sk are equipped with the 1st and 2nd switch elements 42 and 43 out of cascade addition means 41A. In addition, about a switch and a delay control section, drawing 8 is also omitting the graphic display in the delay circuit established in the output side of the 2nd switch element 43 and the mixing signal-processing section, and a list, and that of the switching condition of each switch elements 42 and 43 is the same as that of the thing of drawing 7 in them.

[0042] The example of connecting arrangement of the switch used by this invention and a delay control section is shown in drawing 9. Although a switch and a delay control section are prepared in the digital mixer of each example, you may carry out as [control / like this example, / automatically / from central apparatus / prepare control line CL of dedication and]. Moreover, control line CL may be put in into each digital-mixer connection bus. Furthermore, as long as it is the digital mixer which will consider that it is a cascade master and will control each switch element in a digital mixer if the cascade output CO is the digital mixer of a no connection and by which the bus is connected to the cascade output CO, you may make it control each switch element in a mixer by making it into a cascade slave about switch control.

[0043] [Effectiveness of invention] As explained above, in the bidirectional cascade connection mixer of this invention By the switching means which adds the input addition signal adding the input signal from two or more input channels, and the cascade signal outputted from other digital mixers, outputs as a cascade output, changes by the control means, and is controlled The digital mixer concerned changes the signal given to a mixing output stage to any of an input addition signal or a cascade signal according to a cascade master or a slave. In a mixing output stage Based on setting out by the control means, the switch delay circuit which adjusts the phase contrast between the mixing output signals between each digital mixer is prepared.

[0044] Therefore, according to this invention, the function changed so that the signal with which each digital mixer which receives delivery and it in other digital mixers was sent in the addition result signal of the bus by which cascade connection was carried out may be used can be given, and each bus output can be similarly treated now by returning all addition results to other digital mixers. Therefore, in using the cascade connection of two or more sets of digital mixers, on signal processing, which digital mixer does not need to take a cascade master or a cascade slave into consideration, can deal with each digital mixer, and can take out a total output from the digital mixer of the location of arbitration.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the bidirectional cascade connection mixer with which two or more set cascade connection of the digital mixer is carried out in a digital audio equipment.

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PRIOR ART

[Description of the Prior Art] When using them, carrying out cascade connection of two or more digital mixers which have conventionally the function which processes two or more input signals and is mixed, each digital mixer mixes the cascade output signal from the digital mixer of the preceding paragraph, and he is trying it not only processes and to mix two or more input signals inputted from their internal bus, but to give it to a latter digital mixer.

[0003] Drawing 1 shows this kind of conventional technique. For example, as shown in drawing 1 (1), when cascade connection of the digital mixers MA and MB is carried out and the addition result of the input signal of oneself in each mixers MA and MB is set to "SA" and "SB", the final total addition result "SA+SB" is obtained from the digital mixer MA which is a cascade master, and can obtain only an own addition result "SB" from the digital mixer MB used as a cascade slave.

[0004] Drawing 1 (2) blocks and shows signal processing by the cascade connection of drawing 1 (1). The digital mixer MA has x input channels 1 and 2, --, xch, and the digital mixer MB has y input channels 1 and 2, --, ych. Since the cascade output of the addition result "SB" of the digital mixer MB is carried out and a cascade input is carried out at the digital mixer MA, an addition result "SA+SB" is obtained from the digital mixer MA of a master by adding this cascade input signal to an own addition result "SA." In addition, the delay element DL between the cascade adders AC of the own input adder A.I. Artificial Intelligence of digital mixer MA and the cascade input signal from the digital mixer MB of a slave is formed in order to amend the phase contrast between both the digital mixers MA and MB. [0005] Next, by adding the digital mixer MC of a slave further, as shown in drawing 1 (3), also when cascade connection of the digital mixers MA, MB, and MC is carried out That a final addition result "SA+SB+SC" can be obtained It is the digital mixer MA of the last stage, and only an intermediate addition result "SB+SC" and "SC" (SC is as a result of [of the own input signal of mixer MC] addition) can be obtained from the digital mixers MB and MC of the preceding paragraph.

[0006] Thus, in the conventional technique, when cascade connection of two or more sets of the digital mixers is carried out, the total addition result mixed can be obtained only to the master digital mixer MA of the last stage.

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EFFECT OF THE INVENTION

[Effectiveness of invention] As explained above, in the bidirectional cascade connection mixer of this invention By the switching means which adds the input addition signal adding the input signal from two or more input channels, and the cascade signal outputted from other digital mixers, outputs as a cascade output, changes by the control means, and is controlled The digital mixer concerned changes the signal given to a mixing output stage to any of an input addition signal or a cascade signal according to a cascade master or a slave. In a mixing output stage Based on setting out by the control means, the switch delay circuit which adjusts the phase contrast between the mixing output signals between each digital mixer is prepared.

[0044] Therefore, according to this invention, the function changed so that the signal with which each digital mixer which receives delivery and it in other digital mixers was sent in the addition result signal of the bus by which cascade connection was carried out may be used can be given, and each bus output can be similarly treated now by returning all addition results to other digital mixers. Therefore, in using the cascade connection of two or more sets of digital mixers, on signal processing, which digital mixer does not need to take a cascade master or a cascade slave into consideration, can deal with each digital mixer, and can take out a total output from the digital mixer of the location of arbitration.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] This invention can use the signal mixed also when cascade connection of two or more sets of the digital mixers was carried out with each digital mixer in view of such inconvenience, and aims at offering the bidirectional cascade connection mixer which enabled it to take out a total output from the digital mixer of the location of arbitration.

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MEANS

[Means for Solving the Problem] An input addition means according to this invention to add two or more input signals and to output an input addition signal, The cascade input means for inputting the cascade signal outputted from other digital mixers, A cascade output means to output the addition signal or input signal of an input addition signal and a cascade signal as a cascade signal, The bidirectional cascade connection mixer which changes any of an input addition signal or a cascade signal they are, and possesses the switching means to output and a mixing output means to output the signal outputted from this switching means as a mixing output signal is offered.

[0009] In the bidirectional cascade connection mixer of this invention, it has a delay means for adjusting the phase of a mixing output signal to a mixing output means, and the control means which sets up the change of a switching means and the amount of delay of a delay means is also provided further.

[0010] It is changed whether the result added with the digital mixer itself is outputted by the switching means for changing the bus to output, speaking directly, or the addition result obtained with other digital mixers is outputted, and the delay for adjusting the phase contrast of each digital mixer output is given with a delay means, and a change and the amount of delay of a bus are set as each digital mixer by the memory apparatus with which the control means was equipped.

[Translation done.]

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OPERATION

[Operation] In the bidirectional cascade connection mixer by this invention, the input addition signal adding the signal from two or more input channels and the cascade signal outputted from other digital mixers are added, and it outputs as a cascade output. The switching means which changes by the control means and is controlled changes the signal which the digital mixer concerned gives to a mixing output stage according to a cascade master or a slave to any of an input addition signal or a cascade signal. Based on setting out by the control means, the switch delay circuit which adjusts the phase contrast between the mixing output signals between each digital mixer is established in a mixing output stage. [0012] Therefore, according to this invention, the function changed so that the signal with which each digital mixer which receives delivery and it in other digital mixers was sent in the addition result signal of the bus by which cascade connection was carried out may be used is given. That is, each bus output can be similarly treated now by returning all addition results to other digital mixers. Therefore, in using the cascade connection of two or more sets of digital mixers, on signal processing, which digital mixer does not need to take a cascade master or a cascade slave into consideration, can deal with each digital mixer, and can take out a total output from the digital mixer of the location of arbitration.

[0013]

[Embodiment of the Invention] Hereafter, the suitable example of this invention is explained in full detail, referring to a drawing. In addition, the following examples are mere examples and modification various in the range which does not deviate from the pneuma of this invention is possible for them.

[0014] [Fundamental configuration of a mixer unit] Drawing 2 shows the fundamental example of a unit configuration used as the parent of a cascade connection mixer. This digital mixer 1 is equipped with the input signal terminals T1-Tn of two or more (n) individuals, the cascade input terminal CI, adders 2 and 3, the delay (delay) circuit 4, the mixing output terminal BO, and the cascade output terminal CO. The input signal of input channel 1 ch-nch of two or more (n) books from an internal bus is given to the input signal terminals T1-Tn, and the cascade input signal Sc is given to the cascade input terminal CI through a cascade bus from a preceding paragraph digital mixer. An adder 2 adds the input signal of channel 1 ch-nch, and an adder 3 performs addition with this addition result signal Si and the cascade input signal Sc from the cascade input terminal CI.

[0015] An adder 2 and the delay circuit 4 prepared among three have the function which amends the phase contrast of the input signal of channel 1 ch-nch of digital mixer 1 self, and the cascade input signal from a preceding paragraph digital mixer as mentioned above, and delay setting out is carried out based on the amount of signal delay of the proper between the preceding paragraph digital mixer connected to the cascade input terminal CI, and this digital mixer 1. When delay of this delay circuit 4 is "0", it is bypassed with the switch element 5 and a delay function is turned off.

[0016] The addition result of an adder 3 is outputted to the own internal bus BUS through the mixing output terminal BO after a carrier beam in processing in the processing section of an equalizer 6, a fader 7, and an ON / off element 8 grade. The addition result of an adder 3 is outputted to the cascade output terminal CO again in order to pass a signal to a next step digital mixer.

[0017] [Two sets of the cases] Now, the internal configuration and connection relation of a digital mixer

of a bidirectional cascade connection mixer by one example of this invention are shown, and drawing 3 (1) is the 1st example of a unit configuration of each digital mixer which constitutes a bidirectional cascade connection mixer, and expresses the internal structure of the digital mixer at the time of taking into consideration only about what is done for the two-set cascade connection of the digital mixer to drawing 3.

[0018] This digital mixer 11 like the example of a basic unit of drawing 2 The input signal terminals T1-Tn of two or more (n) individuals, Mixing output signal processing section 11P which consist of the cascade input terminal CI, the input signal adder 12, the cascade adder 13, the 1st delay circuit 14, the 1st switch element 151, and equalizer 16, fader 17 and ON / off element 18 grade, while having the mixing output terminal BO and the cascade output terminal CO, amelioration adds to the example of drawing 2 further -- having -- the 2- it has the 4th switch elements 152-154 and 2nd delay circuit 19.

[0019] The 2nd delay circuit 19 gives the delay for adjusting the phase contrast of the output of each digital mixer by which cascade connection is carried out, and each switch elements 151-154 and delay circuits 14 and 19 are controlled by the switch and delay control-section 11C which consist of CPUs. A switch and delay control-section 11C receive the control signal from central apparatus through control line CL, and set a change and the amount of delay of a bus as each digital mixer by the memory apparatus with which control-section 11C was equipped.

[0020] Thus, by carrying out cascade connection like drawing 3 (2), changing each switch elements 151-154 suitably, and setting them up, two sets of the digital mixers 11 constituted can make a cascade master one digital mixer 11m (several input channels $n=x$), and they can operate digital mixer 11s (input channel several $n=y$) of another side as a cascade slave. In addition, generally the digital mixer which outputs the addition result of the addition result signal S_i of the signal from an input channel and the cascade input signal S_c from the cascade input terminal CI on an own bus (BUS) is called "cascade master", and the digital mixer which outputs the addition result signal S_i of the signal from an input channel on a cascade output bus (Cascade BUS) is called "cascade slave."

[0021] If it explains in more detail, when using the digital mixer 11 of drawing 3 (1) as cascade master mixer 11m of drawing 3 (2), each switch elements 151-154 are changed like [in digital mixer 11m shown in the lower part of drawing 4]. namely, the 3rd switch element 153 -- an adder -- it connects with (m) 13 side and is set as the condition of adding the own signal S_i of digital mixer 11m and the cascade input signal S_c . moreover, the 4th switch 154 -- an adder -- it connects with (m) 13 side and is set as the condition of choosing S_i+S_c as a result of being added as mentioned above. this time -- the 2nd switch element 152 -- the 2nd delay circuit -- it connects with (m) 19 side and a delay circuit 19 is used for phase correction with a mixing signal [which is outputted from output-signal processing section 11P], and other digital mixer, i.e., cascade slave mixer, 11s mixing signal.

[0022] On the other hand, when using the digital mixer 11 of drawing 3 (1) as cascade slave 11s of drawing 3 (2), each switch elements 151-154 are changed like [in digital mixer 11s shown in the upper part of drawing 4]. That is, the 3rd and 4th switch elements 153,154 are connected with digital mixer 11m a reverse side at (s), and the cascade input signal S_c is set up so that it may be sent only to the mixing output terminal BO side through an adder 13. Moreover, fundamentally [the 2nd switch element 152], it connects a common terminal side at (s), and the 2nd delay circuit 19 is turned off.

[0023] Thus, with the configuration of drawing 3 (1), the 3rd for sending a signal for the signal S_c inputted from the cascade to processing of Bus BUS in addition to the fundamental function to add the cascade input S_c and the 4th changeover switch element 153,154, and the delay circuit 19 for amending the phase contrast generated when returning addition result S_i+S_c to other mixers are added. In addition, although restricted to the two configuration cascade of drawing 3 (1), with the configuration of drawing 5 (1) mentioned later, two or more sets of cascades become possible.

[0024] As shown in drawing 3 (2) and drawing 4 , when cascade connection of two sets of the digital mixers 11m and 11s is carried out, like ****, the signal of cascade master mixer 11m input channel 1 ch-xch is added, addition result S_i+S_c is outputted from the cascade output terminal CO, and it inputs from the cascade slave mixer 11s cascade input terminal CI. Here, in digital mixer 11m, in order to double a phase with the addition result S_i of the signal of own input channel 1 ch-xch from digital mixer

11s at the cascade signal S_c , the addition result signal S_i is added with this cascade input signal S_c , after being adjusted in a delay circuit 14. Both digital mixers [11m and 11s] addition result S_i+S_c is obtained by this.

[0025] This addition result signal S_i+S_c can be sent out to the digital mixer 11s cascade input terminal CI from the this cascade master mixer 11m cascade output terminal CO, and can use an addition result also with a this cascade slave mixer 11s bus BUS output through the 3rd and 4th switch elements 153,154 while it is used with a digital mixer 11m bus (BUS) output.

[0026] Moreover, in order to amend the phase contrast of a digital mixers [11m and 11s] bus (BUS) output, the digital mixer 11m delay circuit 19 is used. Furthermore, by setting up which actuation of the digital mixers 11m and 11s of drawing 4 should be performed to two sets of the digital mixers 11 equipped with the configuration of drawing 3 (1) using memory etc., the switch element 153,154 in each mixer interlocks, and it can change.

[0027] [Three or more sets of the cases] Next, drawing 5 shows the internal configuration and connection relation of a digital mixer of a bidirectional cascade connection mixer by other examples of this invention, and drawing 5 (1) is the 2nd example of a unit configuration of each digital mixer which constitutes a bidirectional cascade connection mixer, and expresses the internal structure of the digital mixer in the case of making it correspond to the cascade connection of three or more sets of digital mixers.

[0028] This digital mixer 21 like the unit of drawing 3 The input signal terminals T1-Tx of two or more (x) individuals, Mixing output signal processing section 21P which consist of the cascade input terminal CI, the input signal adder 22, the cascade adder 23, the 1st and 2nd delay circuits 24 and 29, the 1st and the 2nd switch element 251,252, and equalizer 26, fader 27 and ON / off element 28 grade, Although it has the mixing output terminal BO and the cascade output terminal CO Furthermore, in order to pass the addition result obtained by the cascade output terminal CO to other digital mixers, it has the cascade reply terminal CR and the cascade transmitting terminal CS, and has the 5th switch element 255 corresponding to this. Moreover, each switch element 251,252,255 and delay circuits 24 and 29 are controlled by the same switch as the digital mixer 11 of drawing 3 (1), and delay control-section 21C.

[0029] Drawing 5 (2) by showing the example of the connection condition in the case of carrying out cascade connection of three sets of the digital mixers 21 constituted in this way, changing the switch element 252,255 suitably and setting it up One digital mixer 21m (several input channels $n=x$) can be made into a cascade master, and two sets (input channel several $n=y$) of the digital mixer 21s1 remaining and 21s2 (input channel several $n=z$) can be operated as a cascade slave.

[0030] If it explains in more detail, when using the digital mixer 21 of drawing 5 (1) as cascade master mixer 21m of drawing 5 (2), each switch element 251,252,255 is changed like [in digital mixer 21m shown in the bottom of drawing 6]. namely, the 3rd switch element 255 -- an adder -- it connects with (m) 23 side and is set as the condition of choosing S_i+S_c as a result of adding the own signal S_i of digital mixer 21m and the cascade input signal S_c . this time -- the 2nd switch element 252 -- the 2nd delay circuit -- the mixing signal which is connected to (m) 29 side and outputted from output-signal processing section 21P, and other cascade slave mixer 21s -- the 2nd delay circuit 29 is used for 1 or 21s for phase correction with the mixing output signal of 2.

[0031] On the other hand, in the digital mixer 21 of drawing 5 (1), cascade slave 21s1 of drawing 5 (2), and when using it as 2 for 21s, each switch element 251,252,255 is changed like [in two] for digital mixer 21s1 shown in the pars intermedia and the topmost part of drawing 6 , and 21s. That is, the cascade reply terminal CR prepared in order to pass addition result S_i+S_c from the cascade master mixer 21m cascade output terminal CO to other digital mixers, and the cascade transmitting terminal CS are used. And the signal inputted from the cascade reply terminal CR is outputted from the cascade transmitting terminal CS, and in digital mixer 21s1 which is a cascade slave, and 21s2, it is set up so that the signal from the cascade reply terminal CR may be sent to the mixing output terminal BO.

[0032] each -- for 21s, it sets up so that the signal showing cascade slave 21s1 and addition result S_i+S_c which the 5th switch element 255 of 2 is connected the cascade reply terminal CR side at (s), and is inputted from this cascade slave reply terminal CR may be sent only to each mixing output terminal BO.

moreover, the 1st -- in cascade slave 21s1, a delay circuit 29 can perform phase correction.

[0033] in addition -- drawing 5 (2) and the example of connection of drawing 6 -- the 1st -- the addition result signal from cascade master mixer 21m inputted into the cascade reply terminal CR in cascade slave 21s1 -- the 2nd from the cascade transmitting terminal CS -- it is set up so that the cascade reply terminal CR of cascade slave 21s2 may be passed. the 2nd -- in cascade slave 21s2, although it is set up so that an addition result signal may be sent only to the mixing output terminal BO through the 5th switch element 255 from the SUKEDO reply terminal CR as mentioned above, the 2nd switch element 252 is connected to the common terminal side of the 5th switch element 255, and a delay circuit 29 becomes off.

[0034] Since it cannot realize only by preparing the cascade input / output terminal CI/CO like drawing 3 and drawing 4 (Cascade In/Out) when carrying out cascade connection of three or more sets of the digital mixers, as shown in drawing 5 and drawing 6, in other examples of this invention, a terminal called cascade reply / transmitting terminal CR/CS (Cascade Return/Send) is provided. and the final addition result obtained by these cascade return ***** CR and CS by cascade master mixer 21m -- connection of the cascade input/output terminals CI and CO -- the same -- connecting -- each cascade slave mixer 21s -- it enables it to use this addition result by 2 for 1 or 21s

[0035] However, although it goes to cascade master mixer cascade slave mixer 21s2 and 21s1 to 21m in the cascade input/output terminals CI and CO, the flow of a signal is constituted by cascade return ***** CR and CS so that it may go to slave mixer 21s1 and 21s2 from master mixer 21m. That is, therefore, it comes to choose the return signal from master mixer 21m as slave mixer 21s1 and 21s2.

[0036] As the 3rd switch element 153 prepared in drawing 3 and the example of a configuration of drawing 4 is merged into the function of the cascade input terminal CI for receiving the return signal from cascade master mixer 11m and shows the cascade input terminal CI to drawing 5 and drawing 6, it is communalized as a cascade reply terminal CR, and this reply terminal CR has the semantics as a functional changeover switch. In addition, although two sets of cascade connection are realizable with the digital mixer constituted like drawing 5 and drawing 6, since the cost rise by attaching cascade return ***** CR and CS occurs, when it limits a function to two sets of cascades, it is better [a configuration like drawing 3 and drawing 4].

[0037] Moreover, neither the cascade input/output terminals CI and CO nor cascade return ***** CR and CS needs to exist independently, and an exchange of a signal is attained by one cable by giving an I/O function to one connector.

[Translation done.]

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EXAMPLE

[Another example] Drawing 7 and drawing 8 express the example of a configuration of the whole cascade connection digital mixer by still more nearly another example of this invention to a **** outline target. Drawing 7 shows other examples which pass the total output outputted to the total output line tangent line from cascade master mixer 31m to k sets of cascade slave mixer 31s1-31sk(s). Each digital mixer is equipped with the 1st and 2nd switch elements 32 and 33 out of cascade addition means 31A. In addition, about the switch and the delay control section, the graphic display is omitted in the delay circuit established in the output side of the 2nd switch element 33 and the mixing signal-processing section, and a list.

[0039] The switching condition of each switch elements 32 and 33 is controlled like a graphic display according to being used as a cascade master or a cascade slave etc. That is, in the case of cascade master mixer 31m, the 1st switch element 32 is surely made into an ON state, the 2nd switch element 33 is made into an ON state at the adder 31A side, and a total output is obtained by the cascade master mixer 31m mixing output OUTm.

[0040] On the other hand, in cascade slave mixer 31s1-31sk, the 1st switch element 32 is surely made into an OFF state, and the 2nd switch element 33 is made into the switching condition of arbitration according to the mixing output needed. Therefore, to each mixing output OUT1 of cascade slave 31s1-31sk - OUTk, the output according to the established state of the 2nd switch element 33 can be obtained.

[0041] Drawing 8 shows still more nearly another example which added two terminals like drawing 5 and drawing 6, and raised the degree of freedom of a mixing output. Each digital mixer 41m and 41s1-41sk are equipped with the 1st and 2nd switch elements 42 and 43 out of cascade addition means 41A. In addition, about a switch and a delay control section, drawing 8 is also omitting the graphic display in the delay circuit established in the output side of the 2nd switch element 43 and the mixing signal-processing section, and a list, and that of the switching condition of each switch elements 42 and 43 is the same as that of the thing of drawing 7 in them.

[0042] The example of connecting arrangement of the switch used by this invention and a delay control section is shown in drawing 9. Although a switch and a delay control section are prepared in the digital mixer of each example, you may carry out as [control / like this example, / automatically / from central apparatus / prepare control line CL of dedication and]. Moreover, control line CL may be put in into each digital-mixer connection bus. Furthermore, as long as it is the digital mixer which will consider that it is a cascade master and will control each switch element in a digital mixer if the cascade output CO is the digital mixer of a no connection and by which the bus is connected to the cascade output CO, you may make it control each switch element in a mixer by making it into a cascade slave about switch control.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is drawing showing the example of a cascade connection mixer by the conventional technique.

[Drawing 2] Drawing 2 is drawing showing the fundamental example of a unit configuration used as the parent of a cascade connection mixer.

[Drawing 3] Drawing 3 is drawing showing the internal configuration and connection relation of a digital mixer of a bidirectional cascade connection mixer by one example of this invention.

[Drawing 4] Drawing 4 is the concrete connection diagram of the bidirectional cascade connection mixer by one example of this invention.

[Drawing 5] Drawing 5 is drawing showing the internal configuration and connection relation of a digital mixer of a bidirectional cascade connection mixer by other examples of this invention.

[Drawing 6] Drawing 6 is the concrete connection diagram of the bidirectional cascade connection mixer by other examples of this invention.

[Drawing 7] Drawing 7 is drawing showing the rough configuration of the bidirectional cascade connection mixer by another example of this invention.

[Drawing 8] Drawing 8 is drawing showing the rough configuration of the bidirectional cascade connection mixer by still more nearly another example of this invention.

[Drawing 9] Drawing 9 is drawing showing the example of connecting arrangement of the switch used by this invention, and a delay control section.

[Description of Notations]

11, 21, 31, 41 Digital mixer,

11C, 21C A switch and delay control section,

11P, 21P Mixing output signal processing section,

12 22 Input signal adder,

13 23 Cascade adder,

153,154; 255; 32 and 33; -- 42 and 43 Switch element,

19 29 Delay (delay) circuit,

T1-Tn, Tx, Ty, Tz Input signal terminal,

BO Mixing output terminal,

CI Cascade input terminal,

CO Cascade output terminal.

[Translation done.]

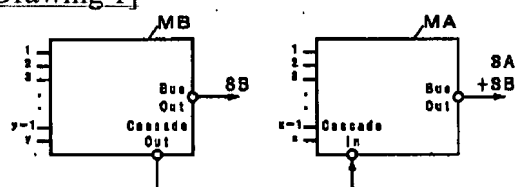
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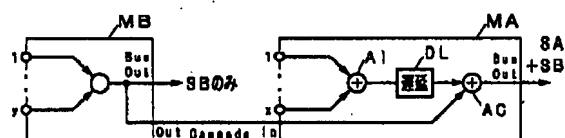
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DRAWINGS

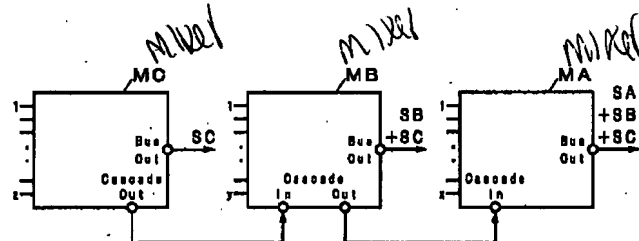
[Drawing 1]



(1) 2台連続時



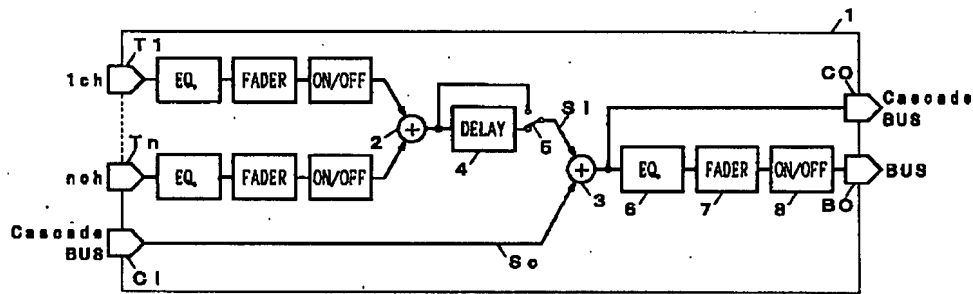
(2) 信号処理ブロック [2台連続]



(3) 3台連続時

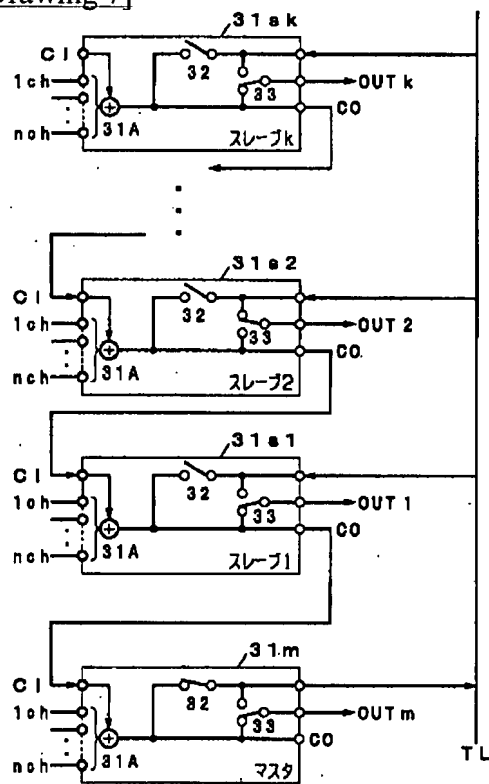
従来技術

[Drawing 2]



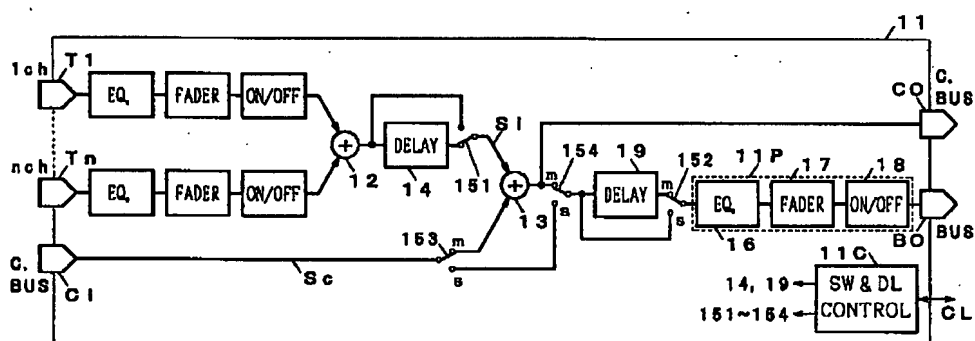
ミキサの基本構造

[Drawing 7]

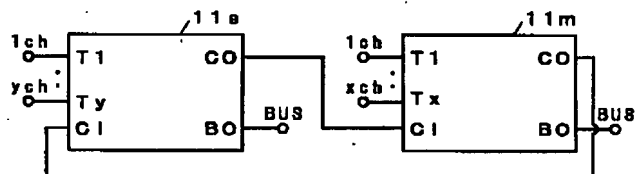


その他の例 (1)

[Drawing 3]

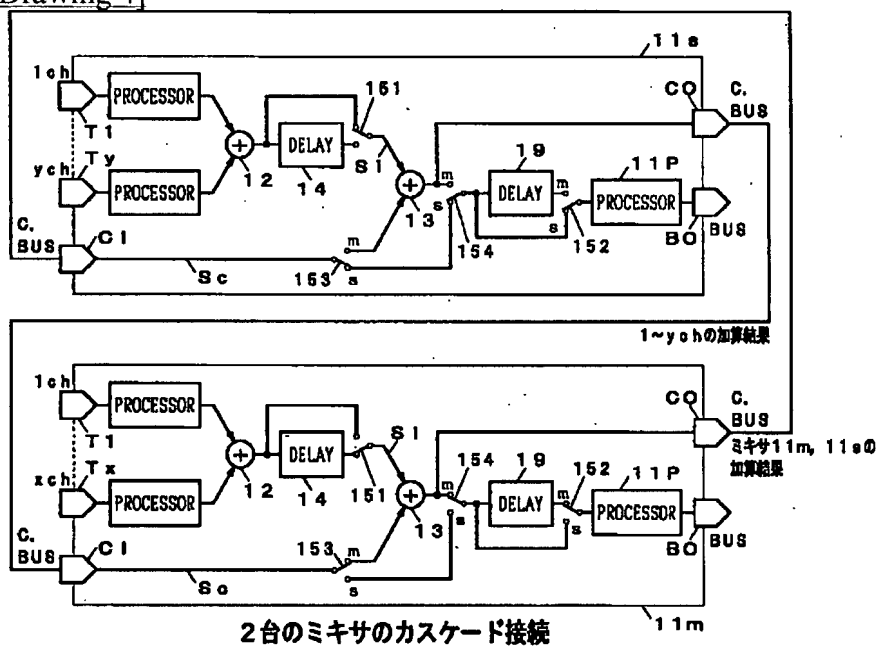


(1) ミキサの内部構成例【2台連続の場合】



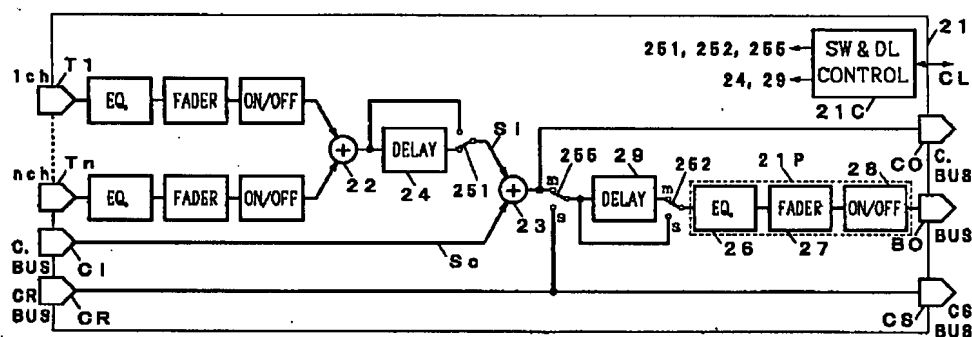
(2) ミキサの接続【2台連続の場合】

[Drawing 4]

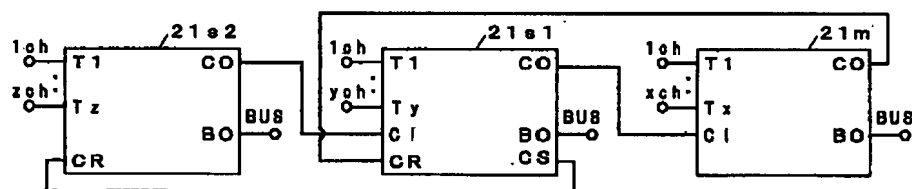


2台のミキサのカスケード接続

[Drawing 5]

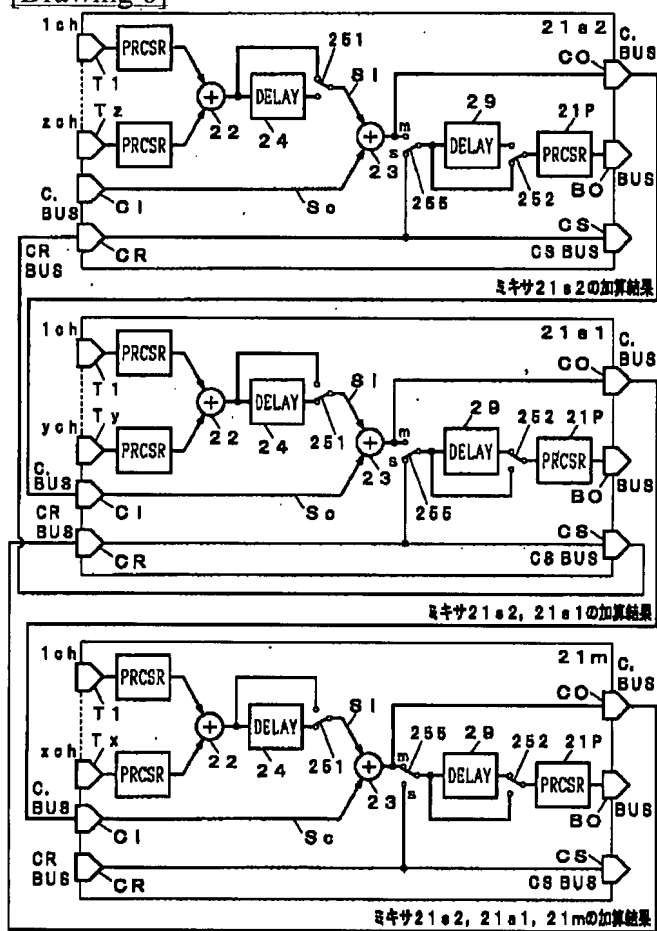


(1) ミキサの内部構成例【3台以上接続の場合】



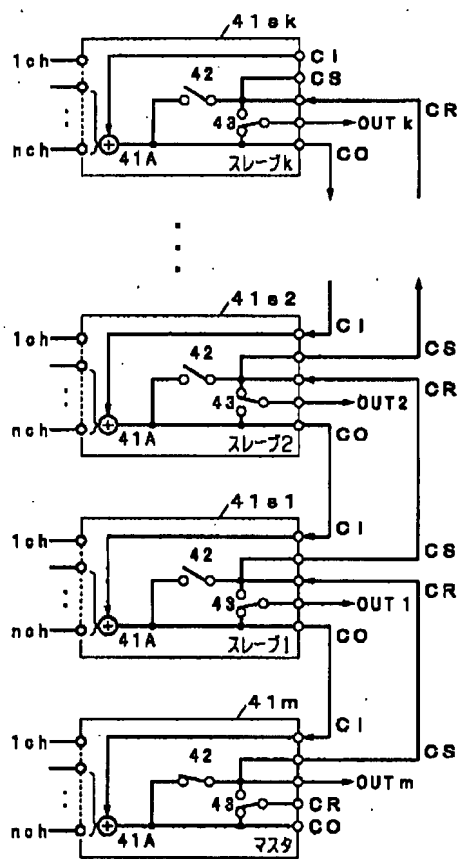
(2) ミキサの接続【3台接続の場合】

[Drawing 6]



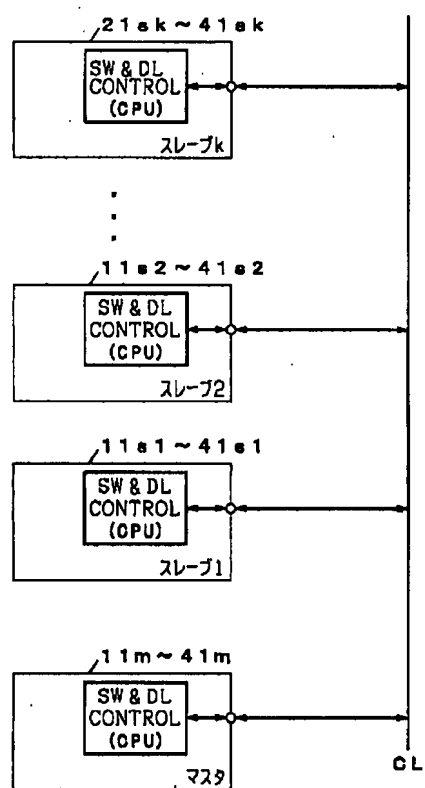
3台のミキサのカスケード接続

[Drawing 8]



その他の例 (2)

[Drawing 9]



スイッチ制御部の配置

[Translation done.]

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CORRECTION OR AMENDMENT

[Kind of official gazette] Printing of amendment by the convention of 2 of Article 17 of Patent Law
 [Category partition] The 3rd partition of the 7th category
 [Publication date] September 2, Heisei 16 (2004. 9.2)

[Publication No.] JP,2000-261391,A (P2000-261391A)
 [Date of Publication] September 22, Heisei 12 (2000. 9.22)
 [Application number] Japanese Patent Application No. 11-58908
 [The 7th edition of International Patent Classification]

H04H 7/00

[FI]

H04H 7/00

[Procedure amendment]
 [Filing Date] August 21, Heisei 15 (2003. 8.21)
 [Procedure amendment 1]
 [Document to be Amended] Description
 [Item(s) to be Amended] Claim
 [Method of Amendment] Modification
 [The content of amendment]
 [Claim(s)]
 [Claim 1]

An input addition means to add two or more input signals and to output an input addition signal,
 The cascade input means for inputting the cascade signal outputted from other digital mixers,
 A cascade output means to output the addition signal or said input addition signal of said input addition signal and cascade signal as a cascade signal,
 said addition signal or an input addition signal -- or the switching means which changes and outputs the cascade signal inputted by said cascade input means, or any of **,
 A mixing output means to output the signal outputted from this switching means as a mixing output signal

The bidirectional cascade connection mixer characterized by providing.

[Claim 2]

Said mixing output means is a bidirectional cascade connection mixer according to claim 1 characterized by having a delay means for adjusting the phase of a mixing output signal.

[Claim 3]

Further,

The control means for setting up the change of said switching means, and the amount of delay of said

delay means

The bidirectional cascade connection mixer according to claim 2 characterized by providing.

[Procedure amendment 2]

[Document to be Amended] Description

[Item(s) to be Amended] 0008

[Method of Amendment] Modification

[The content of amendment]

[0008]

[Means for Solving the Problem]

An input addition means according to this invention to add two or more input signals (1 ch-nch), and to output an input addition signal (Si) (12 22), The cascade input means for inputting the cascade signal (Sc, tangent line) outputted from other digital mixers (CI, CR), A cascade output means to output the addition signal (Si+Sc) or input addition signal (Si) of an input addition signal (Si) and a cascade signal (Sc) as a cascade signal (Sc, tangent line) (CO), an addition signal (Si+Sc) or an input addition signal (Si) -- or The switching means which changes and outputs the cascade signal (Sc, tangent line) inputted by the cascade input means (CI, CR), or any of ** (153, 154 and 255, 32-33, 42-43), The bidirectional cascade connection mixer possessing a mixing output means (BO) to output the signal outputted from this switching means as a mixing output signal (BUS, OUTm-OUT1 - OUTk) is offered. In addition, parenthesis writing is the reference designator of the example added for the facilities of an understanding.

[Procedure amendment 3]

[Document to be Amended] Description

[Item(s) to be Amended] 0011

[Method of Amendment] Modification

[The content of amendment]

[0011]

[Function]

In the bidirectional cascade connection mixer by this invention, the addition signal of the input addition signal adding the signal from two or more input channels, or a this input addition signal and the cascade signal outputted from other digital mixers is outputted as a cascade output. the signal with which the digital mixer concerned gives the switching means which changes by the control means and is controlled to a mixing output stage according to a cascade master or a slave -- an addition signal or an input addition signal -- or it changes to any of a cascade signal. Based on setting out by the control means, the switch delay circuit which adjusts the phase contrast between the mixing output signals between each digital mixer is established in a mixing output stage.

[Procedure amendment 4]

[Document to be Amended] Description

[Item(s) to be Amended] 0043

[Method of Amendment] Modification

[The content of amendment]

[0043]

[Effect of the Invention]